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Print

L5: Entry 5 of 25

File: USPT

Jan 7, 2003

DOCUMENT-IDENTIFIER: US 6504621 B1

TITLE: System for managing resource deficient jobs in a multifunctional printing system

Application Filing Date (1):  
19981222Brief Summary Text (58):

U.S. Pat. No. 5,327,526 discloses a print job control system which processes print requests to set an order of priority for printing print jobs. A print job manager checks the print request and determines what print option is selected and manipulates the queue identifiers associated with respective print jobs and enters them into a print queue table. One feature allows changing the print order thereby overriding the designated print option. Another feature allows for increasing the priority of low priority jobs regardless of the designated print option assuring that the low priority jobs will be printed.

Brief Summary Text (65):

In accordance with the presently disclosed invention there is provided a method for a printing system with a queue for structuring an order in which a plurality of jobs is to be processed with the printing system. A first set of resources is provided to the printing system for processing each of the plurality of jobs, and one of the plurality of jobs is programmed with a second set of resources indicating the specific resources required for processing the job pursuant to marking thereof. The method, which is intended for managing the processing of the one of the plurality of jobs when one or more of the resources of the second set of resources is currently unavailable in the first set of resources, includes the steps of: (a) providing a policy dictating how a given job should be managed, relative to the queue, when a resource mismatch exists between the first set of resources and a set of resources programmed for the given job; (b) determining if a resource mismatch exists between the first set of resources and the second set of resources; (c) when it is determined with said (b) that a resource mismatch exists between the first set of resources and the second set of resources, using said policy to either, (i) hold the one of the plurality of jobs or the identifier for the one of the plurality of jobs in the queue until a first preselected condition is met, or (ii) prohibit holding of the one of the plurality of jobs or the identifier for the one of the plurality of jobs in the queue.

Detailed Description Text (28):

Referring to FIG. 7, a queue of jobs 200 ready for processing with the printer 20 (FIG. 1) is shown. As with other conventional print queues, the job currently being printed is displayed in a window 202 and buttons 204 can be employed to scroll the list of jobs up or down. It should be appreciated that in a multifunctional machine, of the type discussed in the Background above, more than one queue would preferably be employed to accommodate for the various services offered. For example, jobs waiting to be scanned would reside in a scan queue while jobs waiting to be faxed would reside in a fax queue. Essentially the print or mark queue of FIG. 7 may be just one of the plurality of queues employed in the printing system 10. Additionally, it should be appreciated that jobs may be inserted into the queues in a manner consistent with that disclosed by U.S. Pat. No. 5,206,735.

Finally, it will be appreciated that the queue could be maintained in, among other locations, the VCM FIG. 3 or the Network Service Module (FIG. 6).

Detailed Description Text (116):

1:02:51, QM requests MFSYS to begin printing the Copy Job. (QM-MF1)

Detailed Description Text (179):

1:02:51, QM requests ESS to restart printing the Net Print Job. (QM-ES3)

Detailed Description Text (260):

Referring now to FIGS. 11-13, a process for managing a resource deficient job, relative to the queue 302 is described. Initially, for each job provided to the printing system 10, the job queue manager 304 determines, at step 310, the job type and user type of each job in accordance with the principles described above.

CLAIMS:

1. In a printing system with a queue for structuring an order in which a plurality of jobs are to be processed with the printing system, a first set of resources being provided to the printing system for processing each of the plurality of jobs, one of the plurality of jobs being programmed with a second set of resources indicating the specific resources required for processing the job, a method for managing the processing of the one of the plurality of jobs when one or more of the resources of the second set of resources is currently unavailable in the first set of resources, comprising: (a) providing a policy dictating how a given job should be managed, relative to the queue, when a resource mismatch exists between the first set of resources and a set of resources programmed for the given job; (b) determining if a resource mismatch exists between the first set of resources and the second set of resources; (c) when it is determined with said (b) that a resource mismatch exists between the first set of resources and the second set of resources, using said policy to either, (i) hold the one of the plurality of jobs or the identifier for the one of the plurality of jobs in the queue until a first preselected condition is met, or (ii) prohibit holding of the one of the plurality of jobs or the identifier for the one of the plurality of jobs in the queue; and (d) configuring the policy so that (i) a job or job identifier corresponding with a first resource deficient job type is to be held in the queue until the first preselected condition is met and that a job or job identifier corresponding with a second resource deficient job type is not to be held in the queue for processing thereof, and (ii) only certain types of resource deficient jobs are held in the queue for processing.

11. A queue management system for use with a printing system having a queue for structuring an order in which a plurality of jobs is to be marked with the printing system, a first set of resources being provided to the printing system for processing each of the plurality of jobs, one of the plurality of jobs being programmed with a second set of resources indicating the specific resources required for processing the job pursuant to marking, said queue management system, which manages the processing of the one of the plurality of jobs when one or more of the resources of the second set of resources is currently unavailable in the first set of resources, comprises: (a) a memory including a policy dictating how a given job should be managed, relative to the queue, when a resource mismatch exists between the first set of resources and a set of resources programmed for the given job; (b) a processor for determining if a resource mismatch exists between the first set of resources and the second set of resources; (c) said processor, when determining that a resource mismatch exists between the first set of resources and the second set of resources, using the policy to either, (i) hold the one of the plurality of jobs or the identifier for the one of the plurality of jobs in the queue until a first preselected condition is met, or (ii) prohibit holding of the one of the plurality of jobs or the identifier for the one of the plurality of jobs in the queue; and (d) a timer for setting a selected time interval, wherein said

processor causes the one of the plurality of jobs or the identifier for the one of the plurality of jobs to be held in the queue until the selected time interval set with the timer has expired.

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Print

L5: Entry 7 of 25

File: USPT

Dec 24, 2002

DOCUMENT-IDENTIFIER: US 6498656 B1

TITLE: Rule based selection criteria for controlling print job distribution

Abstract Text (1):

Disclosed is a system for routing/print jobs to one of a plurality of printers or print queues, such as a logical print queue. After providing a print job, a set of printers capable of printing the print job is determined. The set of printers is queried to determine status information thereon. A criterion is then applied to the status information for the set of printers to determine a subset of printers. The determined subset is dependent upon the determined status information. A printer is selected from the subset and the print job is routed to the selected printer.

Application Filing Date (1):

19980826

Brief Summary Text (6):

A print job is comprised of one or more electronically-stored files and the print attributes therefor. The print attributes inform the printer how to process the files. To assemble print jobs, previous systems include software installed on the client computer that displays a graphical user interface (GUI). Using a mouse, keyboard, etc., the user selects from a menu of options displayed in the GUI the components and print attributes for a print job. The client computer, under control of the installed software, would then create an electronically-stored job ticket based on the information entered by the user or systems operator.

Brief Summary Text (7):

Job tickets typically only define the print attributes for a single file. However, a document may be comprised of multiple files, each having one or more print attributes. A file submitted to the printer often includes printer instructions in a page description language (PDL) such as POSTSCRIPT.TM.. POSTSCRIPT is a trademark of Adobe Systems, Incorporated. The PostScript language is used by many printers and applications to provide the complex fonts, graphics, and image handling capabilities required by today's applications. The PostScript language must be interpreted by a transform process in the printer or elsewhere in the network to produce a printed image file that is ready to be printed. Print image files are in a bit-mapped image format, also known as a raster image. A raster image processor (RIP) translates PDL files to a raster image or RIP version of the file. In the desktop publishing environment, it can take several hours to transform a large PDL print file to its RIP version.

Brief Summary Text (9):

In previous systems, including those that implement the ISO DPA 10175, POSIX 1387.4 and PSIS printing standards, such as the IBM Printer Resource Manager products, print jobs are received and queued at a single point before being routed to a logical printer or printer that can handle the print job. Such a single point queue is sometimes referred to as a "spooler." Spoolers are servers that accept requests from many clients, validate job and document attributes with those of the intended print destination, provide queuing and scheduling, and then route jobs/documents to the appropriate printer. A queued print job is then transferred to a logical printer, which then routes the print job to a queue for one or more physical

printers.

Brief Summary Text (13):

In further embodiments, printers are organized according to print queues, wherein each print queue routes print jobs to at least one associated printer. In such case, the print queues are processed and the criterion are applied to the queues to determine a subset of print queues. The print job is then routed to a print queue, which then routes the print job to a printer associated with the print queue.

Detailed Description Text (10):

After selecting a print job from the queue, the printer manager 6 then determines those logical printers that are capable of printing the RIPPed files of the print job. A logical printer is used to relate a queue to one or more printers. A logical printer groups physical printers that share a common set of print attributes and can print jobs having such common set of print attributes in a consistent manner. Typically, logical printers are associated with a single queue that spools the RIPPed print jobs to one of the physical printers associated with the logical printer. FIGS. 2a, b, c illustrate different configurations of how a logical printer relates to one or more queues which in turn feed print jobs to one or more physical printers 12a, b, c, d. In FIG. 2a, a single queue routes RIPPed print jobs from a single logical printer queue to one of many physical printers. In FIG. 2b, a single queue routes RIPPed print jobs from multiple logical printers to a single physical printer in a funnel configuration. FIG. 2c illustrates an hourglass configuration of a many to many relationship of logical printers to queues to physical printers. In preferred embodiments, logical printer queues are implemented in the printer controllers 8a, b, c. Multiple logical printer queues may be implemented in a single printer controller 8a, b, c.

Detailed Description Text (13):

The next criteria may be a "queue depth rule" which considers the activity in the queue associated with the set of logical printers. This rule may consider the number of jobs in the queue, the byte size total of all jobs in the queue, the number of pages of all jobs, etc. In preferred embodiments, the queue depth may also include jobs that will soon be routed to the queue, i.e., a look-ahead capability. For instance, in many systems, in a multi-component print job, if a printer is already designated to handle one of the component print jobs, then the other component print jobs will be routed to that printer. The look-ahead capability factors into the queue depth the number of component print jobs, according to size, number of pages, bytes, etc., of print jobs that will be routed to the queue. The queue depth rule may be applied to further narrow the set of available logical printers by considering only printers having a certain queue depth. The queue depth rule maximizes the load balancing of the print workload because the queue depth rule selects those logical printers whose printers 12a, b, c, d have low use.

Detailed Description Text (21):

Block 44 represents the printer manager 6 applying the reuse criterion to the candidate logical printers resulting from step 38 to obtain a further subset of candidate logical printers. Control then transfers to block 48 which represents the printer manager 6 determining whether more than one of the subset of candidate logical printers satisfies the application of the reuse criterion after the queue depth criterion. If so, control transfers to block 50; otherwise, control transfers to block 52 to route the print job to the single logical printer remaining after application of the reuse criterion. Block 50 represents the printer manager 6 applying a tie breaker rule to select one from the remaining candidate logical printers and then routing the print job to the logical printer queue selected.

Detailed Description Text (29):

In yet further embodiments, the rule based criteria could be applied in a single server including a plurality of queues, wherein each queue routes RIPPed print jobs

to one or more printers. In such case, the server would apply the rule based criteria to select from one of the many queues.

CLAIMS:

1. A method for routing print jobs to one of a plurality of printers, comprising the steps of: providing a print job having attributes defining how the print job will be printed; determining a set of print queues associated with at least one printer capable of printing the print job according to the print job attributes, wherein each print queue defines at least one associated printer; querying the set of print queues to determine status information concerning processing of print jobs at printers associated with the set of determined print queues; applying a criterion to the status information for the set of determined print queues to determine a subset of print queues, wherein the determined subset is dependent upon the determined status information; selecting a print queue from the determined subset of print queues; and routing the print job to one printer associated with the selected print queue.

5. The method of claim 4, wherein the queue depth criterion determines the print queues in the set having a minimum queue depth.

6. The method of claim 1, wherein the subset of print queues is a first subset, further comprising the step of applying a second criterion to the first subset of print queues when the first subset of print queues includes a plurality of print queues to determine a second subset of print queues, wherein the step of selecting a print queue comprises selecting a print queue from the second subset.

8. A method for routing print jobs to one of a plurality of printers, comprising: providing a print job having attributes defining how the print job will be printed, wherein the print job is comprised of pointers to at least one component print file; determining a set of printers capable of printing the print job according to the print job attributes by determining a set of print queues, wherein each print queue defines at least one associated printer; querying the set of print queues to determine status information concerning the processing or print jobs in the printers associated with the queues in the set; applying a first criterion to the status information for the print queues to determine a first subset of print queues, wherein the determined first subset is dependent upon the determined status information, and wherein the print queues in the first subset are located in one of at least two printer controllers, wherein a network provides communication between the printer controllers; applying a second criterion to the first subset of print queues when the first subset of print queues includes a plurality of print queues to determine a second subset of print queues by determining at least one print queue in the first subset located in a printer controller having a copy of at least one component print file of the print job; selecting a print queue from the second subset; and routing the print job to the selected print queue, wherein the print queue routes the print job to a printer associated with the print queue.

10. A method for routing print jobs to one of a plurality of printers, comprising: providing a print job having attributes defining how the print job will be printed, wherein the print job includes pointers to component printer files, wherein at least one component print file is located in a first printer controller and the selected print queue is in a second printer controller, wherein a network provides communication between the printer controllers, determining a set of printers capable of printing the print job according to the print job attributes by determining a set of print queues, wherein each print queue defines at least one associated printer; querying the set of print queues to determine status information concerning the processing of print jobs in the printers associated with the queues in the set; applying a criterion to the status information for the print queues to determine a subset of print queues, wherein the determined subset is dependent upon the determined status information; selecting a print queue of

associated printers from the determined subset; and routing a component print file of the print job to a print queue by routing the component print file from the first printer controller to the second printer controller including the selected print queue via the network, wherein the print queue routes the component print file to one printer associated with the print queue.

11. A system for routing print jobs to one of a plurality of printers, comprising: a plurality of printers; a plurality of print queues, wherein each print queue defines at least one associated printer; a server in communication with the plurality of print queues; program logic executed by the server, comprising: (i) means for selecting a print job having attributes defining how the print job will be printed; (ii) means for determining a set of print queues associated with at least one printer capable of printing the print job according to the print job attributes; (iii) means for querying the set of determined print queues to determine status information concerning processing of print jobs at the determined set of print queues; (iv) means for applying a criterion to the status information for the determined set of print queues to determine a subset of print queues, wherein the determined subset is dependent upon the determined status information; (v) means for selecting a print queue from the subset; and (vi) means for routing the print job to one printer associated with the selected print queue.

13. The system of claim 12, wherein the queue depth criterion determines the print queues in the set having a minimum queue depth.

14. The system of claim 11, wherein the subset of print queues is a first subset, wherein the program logic executed by the server further comprises means for applying a second criterion to the first subset of print queues when the first subset of print queues includes a plurality of print queues to determine a second subset of print queues, wherein the means for selecting a print queue comprises selecting a print queue from the second subset.

15. A system for routing print jobs to one of a plurality of printers wherein a print job is comprised of at least one pointer to at least one component print file, comprising: a plurality of printers, wherein printers are associated with print queues, and where each print queue defines at least one associated printer; a server in communication with the plurality of printers; a plurality of printer controllers; a network providing communication among the printer controllers and the printers; and program logic executed by the server, comprising: (i) means for selecting a print job having attributes defining how the print job will be printed; (ii) means for determining a set of print queues including printers capable of printing the print job according to the print job attributes; (iii) means for querying the set of print queues to determine status information concerning the processing of print jobs in the printers associated with the queues in the set; (iv) means for applying a first criterion to the status information for the print queues to determine a first subset of print queues, wherein the determined subset is dependent upon the determined status information, and wherein the print queues in the first subset are located in at least one of the printer controllers; (v) means for applying a second criterion to the first subset of print queues when the first subset of print queues includes a plurality of print queues to determine at least one print queue in the first subset located in a printer controller having a copy of at least one component print file of the print job; (v) means for selecting one print queue from the second subset; and (vi) means for routing the print job to the selected print queue, wherein the print queue routes the print job to a printer associated with the print queue.

16. The system of claim 15, wherein the means for applying the second criterion determines at least one print queue that is located in a printer controller having a maximum of component print files for the print job.

17. A system for routing print jobs to one of a plurality of printers wherein the



print job includes pointers to component printer files, comprising: a plurality of printers, wherein printers are associated with print queues, and where each print queue defines at least one associated printer; a server in communication with the plurality of printers; a plurality of printer controllers; a network providing communication among the printer controllers and the printers; and program logic executed by the server, comprising: (i) means for selecting a print job having attributes defining how the print job will be printed; (ii) means for determining a set of print queues including printers capable of printing the print job according to the print job attributes; (iii) means for querying the set of print queues to determine status information concerning the processing of print jobs in the printers associated with the queues in the set; (iv) means for applying a criterion to the status information for the print queues to determine a subset of print queues, wherein the determined subset is dependent upon the determined status information; (v) means for selecting one print queue from the subset, wherein at least one component print file is located in a first printer controller and the selected print queue is located in a second printer controller; (vi) means for routing a component print file of the print job to a print queue by routing the component print file from the first printer controller to the second printer controller including the selected print queue via the network.

18. An article of manufacture for use in programming a computer to route print jobs to printers, the article of manufacture comprising computer readable storage media including at least one computer program embedded therein that causes the computer to perform the steps of: providing a print job having attributes defining how the print job will be printed; determining a set of print queues associated with at least one printer capable of printing the print job according to the print job attributes, wherein each print queue defines at least one associated printer; querying the set of print queues to determine status information concerning the processing of print jobs at the set of print queues; applying a criterion to the status information for the set of print queues to determine a subset of print queues, wherein the determined subset is dependent upon the determined status information; selecting a print queue from the subset; and routing the print job to one printer associated with the selected print queue.

22. The article of manufacture of claim 21, wherein the queue depth criterion determines the print queues in the set having a minimum queue depth.

23. The article of manufacture of claim 18, wherein the subset of print queues is a first subset, further comprising the step of applying a second criterion to the first subset of print queues when the first subset of print queues includes a plurality of print queues to determine a second subset of print queues, wherein the step of selecting a print queue comprises selecting a print queue from the second subset.

25. An article of manufacture for use in programming a computer to route print jobs to printers, the article of manufacture comprising computer readable storage media including at least one computer program embedded therein that causes the computer to perform the steps of: providing a print job having attributes defining how the print job will be printed, wherein the print job is comprised of pointers to at least one component print file; determining a set of printers capable of printing the print job according to the print job attributes by determining a set of print queues, wherein each print queue defines at least one associated printer; querying the set of print queues to determine status information concerning the processing or print jobs in the printers associated with the queues in the set; applying a first criterion to the status information for the print queues to determine a first subset of print queues, wherein the determined first subset is dependent upon the determined status information, and wherein the print queues in the first subset are located in one of at least two printer controllers, wherein a network provides communication between the printer controllers; applying a second criterion to the first subset of print queues when the first subset of print queues includes a

plurality of print queues to determine a second subset of print queues by determining at least one print queue in the first subset located in a printer controller having a copy of at least one component print file of the print job; selecting a print queue from the second subset; and routing the print job to the to the selected print queue, wherein the print queue routes the print job to a printer associated with the print queue.

27. An article of manufacture for use in programming a computer to route print jobs to printers, the article of manufacture comprising computer readable storage media including at least one computer program embedded therein that causes the computer to perform the steps of: providing a print job having attributes defining how the print job will be printed, wherein the print job includes pointers to component printer files, wherein at least one component print file is located in a first printer controller and the selected print queue is in a second printer controller, wherein a network provides communication between the printer controllers, determining a set of printers capable of printing the print job according to the print job attributes by determining a set of print queues, wherein each print queue defines at least one associated printer; querying the set of print queues to determine status information concerning the processing of print jobs in the printers associated with the queues in the set; applying a criterion to the status information for the print queues to determine a subset of print queues, wherein the determined subset is dependent upon the determined status information; selecting a print queue of associated printers from the determined subset; and routing a component print file of the print job to a print queue by routing the component print file from the first printer controller to the second printer controller including the selected print queue via the network, wherein the print queue routes the component print file to one printer associated with the print queue.

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L5: Entry 8 of 25

File: USPT

Jun 4, 2002

DOCUMENT-IDENTIFIER: US 6401150 B1

\*\* See image for Certificate of Correction \*\*

TITLE: Centralized queue in network printing systems

Abstract Text (1):

A centralized queue for a network printing system is provided for allowing clients of a network printer to make job requests and enter a spot in a job queue without transmitting the actual print job data to the network. More particularly, an imaging device protocol (IDP) is provided which operates independently of the network layers below and only requires that a transport protocol/port be bidirectional. A wide variety of heterogenous network protocols may be supported by IDP for placing all of the incoming print job information in a print queue regardless of the protocol. Print job information from both IDP and non-IDP protocol/ports may be placed in the print queue by emulating IDP on the non-IDP protocol/ports. As a result, job information for all of the print jobs attempting to access a busy printer may be stored in the print queue so that the print jobs can be printed by the printer with a fair arbitration once the network printer becomes available.

Application Filing Date (1):

19950606

Brief Summary Text (2):

The present invention is directed to a centralized queue for a network printing system that allows clients of the printer to make job requests and enter a spot in a job queue without transmitting the job print data to the network. More particularly, the present invention stores job information for all of the print jobs attempting to access a busy printer in the print queue so that the print jobs can be printed by the printer with a fair arbitration once the printer becomes available.

Brief Summary Text (8):

Traditionally, print servers provided access to the network printers and ran the programs necessary to create and operate a print queue for jobs sent to the printers from the host computers. The print queue is a directory that stores into the disk 6 the print jobs waiting to be printed. The print jobs are then printed from the print queue in a FIFO sequence. The print servers require storing the job request and entire job data by spooling this data to the disk 6. Depending on the job size, millions of bytes of data may be spooled to the disk and therefore a large sized disk is necessary.

Detailed Description Text (5):

The print job request call is sent from a host computer to request the transmission of a job to the printer. The job ID is a unique numerical identifier for the print job and it could be used to reference print jobs and acquire further information and status. The print job request call may involve a dialog between the host computer and the printer to negotiate the connection to send the print job data on. The printer can elect to send back a result code on the response that gives the host computer an opportunity to send the print job data on the same connection that they are currently communicating over. If the host computer chooses not to use this

communication channel to send the print job data, a normal transmit job command will be used to solicit the print job data by the printer.

Detailed Description Text (6):

A transmit job command is transmitted from the printer to inform a requesting host computer to start transmitting the print job referred to by the job ID. An enumerate queue command may also be transmitted from a requesting host computer to obtain an ordered list of the jobs in the print queue 82. Information that may be received by the requesting host computer includes the number of elements in the print queue 82, the order that the elements in the print queue 82 are scheduled to be printed, the order that completed print jobs in the print queue 82 were printed, and the estimated time that the print job will complete printing or the time that the print job did actually complete printing. A token parameter may also be provided which is used to determine whether the print queue 82 should be enumerated. This token command saves the time and expense of enumerating the print queue 82 if the client has already done so.

Detailed Description Text (13):

An IDP emulator 40 enables connections over non-IDP ports so that the upper layers may uniformly interface with both IDP and non-IDP clients. The IDP emulator 40 monitors connection requests on all non-IDP protocol/ports from the non-IDP I/O network managers 10 and the parallel port I/O manager 20 and emulates IDP requests as the connection requests are received. When a connection request is received from a non-IDP client, the IDP emulator 40 builds an IDP print job request message. The IDP emulator 40 allows non-IDP print jobs to be queued with IDP print jobs so that all of the print jobs may be processed in the order from which the connection attempts were received.

Detailed Description Text (15):

Furthermore, CSCP facilitates reconnection to previously connected hosts. IDP uses the reconnection mechanism to implement remote queuing features, to subsequently request job data and to send asynchronous status updates to clients which support IDP. More particularly, IDP only stores the job data request at the printer when the printer is busy printing another job and the actual job data will remain locally at the host computer. Thereafter, the network printer will call back the host computer which corresponds to the first job data request queued in the print queue after the print job is completed.

Detailed Description Text (19):

Some of the enhanced two-way communication provided by the IDP server 80 includes reading and modifying system parameters, adding and removing fonts, submitting print jobs and manipulating the print queue. By enabling clients of the printer to make job requests which are entered in the print queue without sending the actual print job data, an enhanced set of services for submitting print jobs, retrieving print data queue and asynchronously notifying clients with job status may be achieved. The PDL interpreter 90 may be provided for supporting PostScript, for example. Additional PDL interpreters may be provided to support other languages as desired. The presentation level data from non-IDP protocols/ports is assumed to be PDL data in the example configuration for the present embodiment. The non-IDP network managers 10 and the parallel port managers 20 may be implemented with a UNIX standard I/O interface in a preferred embodiment. The IDP emulator 40 then handles all of the non-IDP protocols/ports, provides a socket interface and emulates the CSCP/IDP interaction necessary to execute print job requests.

Detailed Description Text (21):

The printing system provides a print queue which stores job information for host computers attempting to gain access to the printer through IDP and non-IDP protocol/ports. The print queue stores job information in the print queue through the system services layer 70 without the actual print data and the job information in the print queue is used to achieve a fair arbitration in selecting the host

computer which gains access to the printer when it becomes available. By only transmitting job information while keeping the actual print data with the host computer, then network traffic is also advantageously reduced.

Detailed Description Text (23):

FIG. 4 illustrates a process for connections between IDP clients and the printer for an embodiment of the present invention. At step S600, an IDP host and IDP network manager opens a connection to a well-known CSCP port. The connection is received by the connection services layer 60 via the socket services layer 50 at step S602 and the IDP host sends a CSCP request service port request at step S604. The connection services 60 receives the CSCP request at step S606 and a pending open from the IDP server 80 is received from the connection services 60 via the system services 70 at step S608. At step S610, the IDP host issues a print job request to the IDP server 80 and the IDP server queues the print job and the print queue 82 at step S612 before closing the connection at step S614.

Detailed Description Text (24):

At this point management of the print queue 82 may begin where the system services layer 70 dequeues the print job request at step S616, and issues a reconnection request at step S618. The connection service layer 60 issues and active open to the host via the socket services 50 and the I/O manager 30 at step S620 and the connection services 60 also sends a CSCP request service port to the host at step S622. At step S624, the connection services layer 60 returns from a reconnection request via the system services layer 70. The system services 70 issues "a send job data" IDP request to the host at step S626 and then the systems services layer 70 sends the I/O stream to the PDL interpreter 90 at step S628. The host sends and receives data to and from the PDL interpreter 90 at step S630 and the host closes the connection at S632 when the sending and receiving of data is completed.

Detailed Description Text (25):

FIG. 5 illustrates a process for connections between non-IDP clients and the printer for an embodiment of the present invention. At step S701, a host requests a connection and an I/O manager increments a pending connection count at step S703. The IDP emulator 40 polls the I/O manager for the current pending connection at step S705 and the IDP emulator generates a CSCP request service port request at step S707. The connection services 60 receives a CSCP request at step S709 and a pending open from the IDP server 80 is returned from the connection services 60 via the system services layer 70 at step S711. The IDP emulator 40 then issues a print job request to the IDP server 80 at step S713 and the IDP server queues a print job at step S715. The IDP emulator 40 then closes the connection to the IDP server 80.

Detailed Description Text (26):

At this point management of the print queue 82 may begin. At step S717 where the system services layer 70 dequeues the print job request at step S719 and then issues a connection request at step S721. The connection services 60 issues an active open call to the IDP emulator 40 via the socket services 50 at step S723 and sends a CSCP request service port to the IDP emulator 40 at step S725. The connection services 60 returns from the reconnection request via the system services 70 at step S727 and then the system services 70 issues a "send job data" IDP request to the IDP emulator 40 at step S729. The IDP emulator 40 opens a connection to the corresponding I/O manager at step S731 and the corresponding I/O manager accepts the open connection request from the host at step S733. Next, the system services 70 sends the I/O stream to the PDL interpreter 90 at step S735, the host sends and receives data to and from the PDL interpreter 90 at step S737 before closing the connection to the host at step S739 when the sending and receiving of data is completed.

Detailed Description Text (28):

The print queue 82 contains job information for all of the print jobs that have an outstanding print request to the printer 40 for any of the host computers

400.sub.0 . . . n on the network. A print job request call is one example of the process for enabling communication with the print queue 82. Prior to sending a print job with a print job request call, the host computer sends a print request and a job ID is returned. When the print request is accepted, the job information is placed in the print queue 82. The parameters of the print job request call may include information about the print job and information for enabling the printer to notify the host computer when the job data can be accepted. When the printers are ready to capture the print job data, the printer may initiate a transmit job call which tells the host computer to start transmitting the print job to the printer. As print jobs are completed, their job information is removed from the print queue and entered into a job log. The job information in the print queue 82 may include the job name, the estimated time to print, the document status, the number of pages in the document, the number of pages left to print, the image content, the user comment, the media, and the creator application. The print job request call may provide this information and this information must be presented with the job in order to display the job information.

## CLAIMS:

1. A network printing system comprising:

(a) a plurality of host computers connected to a network; and

(b) a printer connected to the network for receiving and printing print jobs in response to print requests from said host computers, wherein said printer includes a localized print queue for storing print job information for each of said host computers attempting to gain print access to said printer, and wherein each of said host computers communicates with said printer using an application-layer uniform interface protocol.

5. A network printing system according to claim 4, further comprising an IDP emulator for emulating IDP print requests from non-IDP ports so that print job information for both IDP and non-IDP print requests may be queued in said localized print queue.

7. A network printing system comprising:

(a) a plurality of host computers connected to a network; and

(b) a printer connected to the network for receiving and printing print jobs in response to print requests from said host computers, wherein said printer includes a localized print queue for storing print job information for each of said host computers attempting to gain print access to said printer, and wherein said printer initiates a print connection with one of said host computers corresponding to said print job information at a top of said localized print queue when said printer becomes available.

9. A method for queuing jobs in a network printing system comprising the steps of:

(a) using an application-layer uniform interface protocol to conduct communications between each of a plurality of host computers connected to the network and a printer connected to the network;

(b) receiving print requests from said plurality of host computers;

(c) storing print job information in a localized print queue of said printer in response to receiving each print request at said step (b) and

(d) printing a print job on said printer corresponding to print job information at a top of said localized print queue when said printer is available.

13. A method according to claim 12, further comprising the step of emulating IDP print requests from non-IDP ports so that print job information for both IDP and non-IDP print requests may be queued in said localized print queue.

18. A network printing system according to claim 17, further comprising an IDP emulator for emulating IDP print requests from non-IDP ports so that print job information for both IDP and non-IDP print requests may be queued in said localized print queue.

24. A method for queuing and printing jobs in a network printing system comprising the steps of:

(a) receiving, at a localized print queue, print requests from a plurality of host computers connected to the network;

(b) storing print job information in the localized print queue in response to receiving the print requests from the host computers at said step (a);

(c) initiating, from a printer connected to the network, a print connection between the printer and one of the host computers corresponding to print job information at a top of the localized print queue when the printer is available; and

(d) printing a print job on the printer corresponding to print job data received at the printer from the one host computer via the print connection initiated at said step (c).

27. A method according to claim 26, further comprising the step of emulating IDP print requests from non-IDP ports so that print job information for both IDP and non-IDP print requests may be queued in the localized print queue.

31. A peripheral device for receiving and executing jobs in a computing network, comprising:

a localized queue storing print job information for each of a plurality of host computers attempting to gain access to said peripheral device, wherein said peripheral device initiates a job-execution connection with one of said host computers corresponding to print job information at a top of said localized queue when said peripheral device becomes available.

36. A peripheral device according to claim 35, further comprising an IDP emulator for emulating IDP requests from non-IDP ports so that print job information for both IDP and non-IDP requests may be queued in said localized queue.

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L5: Entry 9 of 25

File: USPT

Apr 16, 2002

DOCUMENT-IDENTIFIER: US 6373585 B1

TITLE: Load balancing for processing a queue of print jobs

Abstract Text (1):

A system is provided for processing a print job. A processing unit, such as a server, receives a plurality of print job files. Each print job file is associated with a data file. The print job files are maintained in a queue of print job files. The processing unit selects a print job file in the queue and processes a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file. The processing unit selects an available transform process, such as a RIP process, in response to processing the data structure and indicates in the data structure that the selected transform process is unavailable. The transform process processes the data file associated with the selected print job to generate a printer supported output data stream.

Application Filing Date (1):

19980826

Brief Summary Text (11):

A print job is comprised of one or more electronically-stored files and the print attributes therefor. The print attributes inform the printer how to process the files. To assemble print jobs, prior art systems include software installed on the client computer that displays a graphical user interface (GUI). Using a mouse, keyboard, etc., the user selects from a menu of options displayed in the GUI the components and print attributes for a print job. The client computer, under control of the installed software, would then create an electronically-stored job ticket based on the information entered by the user.

Brief Summary Text (12):

Job tickets typically only define the print attributes for a single file. However, a document may be comprised of multiple files, each having one or more print attributes. A file submitted to the printer often includes printer instructions in a page description language (PDL) such as POST SCRIPT.TM.. POST SCRIPT is a trademark of Adobe Systems, Incorporated. The Post Script language is used by many printers and applications to provide the complex fonts, graphics, and image handling capabilities required by today's applications. The Post Script language must be interpreted by a transform process in the printer or elsewhere in the network to produce a printed image file that is ready to be printed. Print image files are in a bit-mapped image format, also known as a raster image. A raster image processor (RIP) translates PDL files to a raster image or RIP version of the file. In the desktop publishing environment, it can take several hours to transform a large PDL print file to its RIP version.

Brief Summary Text (17):

To overcome the limitations in the prior art described above, the preferred embodiments disclose a system for processing a print job. A processing unit receives a plurality of print job files, wherein each print job file is associated with a data file. The print job files are associated with a queue of print job files. The processing unit selects a print job file in the queue and processes a



data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file. The processing unit selects an available transform process in response to processing the data structure and indicates in the data structure that the selected transform process is now unavailable. The transform process processes the data file associated with the selected print job to generate a printer supported output data stream.

Detailed Description Text (43):

In summary, preferred embodiments in accordance with the present invention provide a system for processing a print job. A processing unit receives a plurality of print job files, wherein each print job file is associated with a data file. The print job files are associated with a queue of printjob files. The processing unit selects a print job file in the queue and processes a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file. The processing unit selects an available transform process in response to processing the data structure and indicates in the data structure that the selected transform process is unavailable. The transform process processes the data file associated with the selected print job to generate a printer supported output data stream.

CLAIMS:

1. A method for processing a print job, comprising the steps of:

receiving a plurality of print job files, wherein each print job file is associated with a data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes executing in a plurality of processing units and the availability of each indicated transform process to process a data file;

selecting an available transform process in response to processing the data structure;

indicating in the data structure that the selected transform process is unavailable; and

processing the data file associated with the selected print job with the selected transform process to generate a printer supported output data stream.

4. A method for processing a print job, comprising:

receiving a plurality of print job files, wherein each print job file is associated with a data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file, wherein a plurality of transform processes are executing in a plurality of processing units, wherein the data structure indicates a processing unit address and an address of the transform process executing within the processing unit;

selecting an available transform process in response to processing the data

structure by determining the address of the processing unit executing the selected transform process and the address of the selected transform process within the processing unit;

indicating in the data structure that the selected transform process is unavailable; and

processing the data file associated with the selected print job with the selected transform process to generate a printer supported output data stream.

6. The method of claim 4, wherein a server performs the steps of receiving the print job files, associating the print job files with the queue, selecting a print job file, processing the data structure, and wherein the step of processing the data file comprises the server causing the transmittal of the data file to the transform process at the determined processing unit address and the determined transform process address.

7. A method for processing a print job, comprising:

receiving a plurality of print job files, wherein each print job file is associated with a data file, wherein the print job file indicates a storage address of the associated data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file;

selecting an available transform process in response to processing the data structure;

indicating in the data structure that the selected transform process is unavailable; and

processing the data file associated with the selected print job with the selected transform process to generate a printer supported output data stream by retrieving the data file from the storage address indicated in the selected print job file and transmitting the data file to the transform process for processing.

9. A method for processing a print job, comprising the steps of:

receiving a plurality of print job files, wherein each print job file is associated with a data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file;

selecting an available transform process in response to processing the data structure;

indicating in the data structure that the selected transform process is unavailable; and

processing the data file associated with the selected print job with the selected

transform process to generate a printer supported output data stream by separating the data file into component parts and processing the component parts to generate printer supported output data stream for each component part, wherein the transform process fails after determining failure of the transform process of at least one of the component parts.

10. A system for processing a print job, comprising:

means for generating print job files, wherein each print job file is associated with a data file;

a plurality of processing units, wherein each processing unit includes at least one executing transform process for processing the data file associated with one print job with to generate a printer supported output data stream;

program logic comprised of:

(i) means for receiving a plurality of print job files, wherein each print job file is associated with a data file;

(ii) means for associating the print job files with a queue of print job files;

(iii) means for selecting a print job file in the queue;

(iv) means for processing a data structure indicating the plurality of transform processes executing in the plurality of processing units and the availability of each indicated transform process to process a data file;

(v) means for selecting an available transform process for processing the selected print job file in response to processing the data structure; and

(vi) means for indicating in the data structure that the selected transform process is unavailable.

13. A system for processing a print job, comprising:

means for generating print job files, wherein each print job file is associated with a data file;

program logic comprised of:

(i) means for receiving a plurality of print job files, wherein each print job file is associated with a data file;

(ii) means for associating the print job files with a queue of print job files;

(iii) means for selecting a print job file in the queue;

(iv) means for processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file, wherein the data structure indicates a processing unit address and an address of the transform process executing within the processing unit;

(v) means for selecting an available transform process in response to processing the data structure by determining the address of the processing unit executing the selected transform process and the address of the selected transform process within the processing unit; and

(vi) means for indicating in the data structure that the selected transform process is unavailable; and

a processing unit including means for processing the data file associated with the selected print job with the selected transform process to generate a printer supported output data stream.

14. A system for processing a print job, comprising:

a storage unit;

means for generating print job files, wherein each print job file is associated with a data file;

program logic comprised of:

(i) means for receiving a plurality of print job files, wherein each print job file is associated with a data file, and wherein the print job file indicates a storage address of the associated data file in the storage unit;

(ii) means for associating the print job files with a queue of print job files;

(iii) means for selecting a print job file in the queue;

(iv) means for processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file;

(v) means for selecting an available transform process in response to processing the data structure; and

(vi) means for indicating in the data structure that the selected transform process is unavailable; and

a processing unit including means for processing the data file associated with the selected print job with the selected transform process to generate a printer supported output data stream by retrieving the data file from the storage address indicated in the selected print job file and transmitting the data file to the transform process for processing.

15. An article of manufacture for use in processing a print job, the article of manufacture comprising computer readable storage media including at least one computer program embedded therein that causes a first processing unit to perform the steps of:

receiving a plurality of print job files, wherein each print job file is associated with a data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes executing in a plurality of processing units and the availability of each indicated transform process to process a data file;

selecting an available transform process in response to processing the data structure;

indicating in the data structure that the selected transform process is unavailable; and

transmitting the data file associated with the selected print file to a second processing unit executing the selected transform process to generate a printer supported output data stream.

18. An article of manufacture for use in processing a print job, the article of manufacture comprising computer readable storage media including at least one computer program embedded therein that causes a first processing unit to perform:

receiving a plurality of print job files, wherein each print job file is associated with a data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file, wherein a plurality of transform processes are executing in a plurality of additional processing units, and wherein the data structure indicates a processing unit address and an address of the transform process executing within the processing unit;

selecting an available transform process in response to processing the data structure by determining the address of the processing unit executing the selected transform process and the address of the selected transform process within the processing unit;

indicating in the data structure that the selected transform process is unavailable; and

transmitting the data file associated with the selected print file to the processing unit executing the selected transform process to generate a printer supported output data stream.

20. An article of manufacture for use in processing a print job, the article of manufacture comprising computer readable storage media including at least one computer program embedded therein that causes a first processing unit to perform:

receiving a plurality of print job files, wherein each print job file is associated with a data file, wherein the print job file indicates a storage address of the associated data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file;

selecting an available transform process in response to processing the data structure;

indicating in the data structure that the selected transform process is unavailable;

retrieving the data file from the storage address indicated in the selected print job file; and

transmitting the data file associated with the selected print file to a second processing unit executing the selected transform process to generate a printer

supported output data stream.

22. An article of manufacture for use in processing a print job, the article of manufacture comprising computer readable storage media including at least one computer program embedded therein that causes a first processing unit to perform:

receiving a plurality of print job files, wherein each print job file is associated with a data file;

associating the print job files with a queue of print job files;

selecting a print job file in the queue;

processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file;

selecting an available transform process in response to processing the data structure;

indicating in the data structure that the selected transform process is unavailable; and

transmitting the data file associated with the selected print file to a second processing unit executing the selected transform process to generate a printer supported output data stream, wherein the transform process separates the data file into component parts and processing the component parts to generate printer supported output data streams for each component part, wherein the transform process fails after determining failure of the transform process of at least one of the component parts fails.

23. A memory device for access by a processing unit including data structures accessible to the processing unit when processing a print job, the memory device comprising:

a plurality of print job data structures, wherein each print job data structure indicates at least one associated data file;

a queue data structure representing a queue of a plurality of received print job data structures, wherein the processing unit selects a print job data structure in the queue; and

a transform process data structure indicating a plurality of transform processes executing in a plurality of transform processing units and the availability of each indicated transform process to process a data file, wherein the processing unit processes the transform process data structure to select an available transform process and indicates in the transform process data structure that the selected transform process is unavailable, wherein the processing unit transfers the data file associated with the selected print job data structure to the selected transform process to generate a printer supported output data stream.

25. A memory device for access by a first processing unit including data structures accessible to the first processing unit when processing a print job, the memory device comprising:

a plurality of print job data structures, wherein each print job data structure indicates at least one associated data file;

a queue data structure representing a queue of a plurality of received print job data structures, wherein the first processing unit selects a print job data structure in the queue; and

a transform process data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file, wherein a plurality of transform processes are implemented in a plurality of additional processing units, wherein the transform process data structure further indicates a processing unit address and an address of the transform process executing within the processing unit, wherein the first processing unit processes the transform process data structure to select an available transform process and indicates in the transform process data structure that the selected transform process is unavailable, wherein the first processing unit determines the address of the processing unit executing the selected transform process and the address of the selected transform process within the transform processing unit, and wherein the first processing unit transfers the data file associated with the selected print job data structure to the selected transform process to generate a printer supported output data stream.

26. A memory device for access by a processing unit including data structures accessible to the processing unit when processing a print job, the memory device comprising:

a plurality of print job data structures, wherein each print job data structure indicates at least one associated data file and a storage address of the data file;

a queue data structure representing a queue of a plurality of received print job data structures, wherein the processing unit selects a print job data structure in the queue; and

a transform process data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file, wherein the processing unit processes the transform process data structure to select an available transform process and indicates in the transform process data structure that the selected transform process is unavailable, and wherein the processing unit retrieves the data file from the storage address indicated in the selected print job data structure and transmits the retrieved data file to the selected transform process to generate a printer supported output data stream.

28. A system for processing a print job, comprising:

means for generating print job files, wherein each print job file is associated with a data file;

program logic comprised of:

(i) means for receiving a plurality of print job files, wherein each print job file is associated with a data file;

(ii) means for associating the print job files with a queue of print job files;

(iii) means for selecting a print job file in the queue;

(iv) means for processing a data structure indicating a plurality of transform processes and the availability of each indicated transform process to process a data file;

(v) means for selecting an available transform process in response to processing the data structure; and

(vi) means for indicating in the data structure that the selected transform process is unavailable; and

a processing unit including means for processing the data file associated with the selected print job with the selected transform process to generate a printer supported output data stream by separating the data file into component parts and processing the component parts to generate printer supported output data streams for each component part, wherein the transform process fails after determining failure of the transform process of at least one of the component parts fails.



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Print

L5: Entry 10 of 25

File: USPT

Sep 11, 2001

DOCUMENT-IDENTIFIER: US 6288790 B1  
TITLE: Mobility support for printing

Application Filing Date (1):  
19980515

Detailed Description Text (3):

Network 106 may be a local area network (LAN) or any other network over which print requests may be submitted to a remote printer or print server. Communications link 104 may be in the form of a network adapter, docking station, or the like, and supports communications between data processing system 102 and network 106 employing a network communications protocol such as Ethernet, the AS/400 Network, or the like.

Detailed Description Text (4):

In accordance with the known art, network 106 includes a print server/printer 108 serving print requests over network 106 received via communications link 110 between print server/printer 108 and network 106. The operating system on data processing system 102 is capable of selecting print server/printer 108 and submitting requests for services to print server/printer 108 over network 106. Print server/printer 108 includes a print queue for print jobs requested by remote data processing systems.

Detailed Description Text (6):

Referring to FIGS. 2A-2B, implementation diagrams of a mobile print support facility in accordance with a preferred embodiment of the present invention is illustrated. FIG. 2A illustrates in general the components of the mobile print support facility of the present invention. Mobile print support facility 200 is implemented within a data processing system, such as data processing system 102 depicted in FIG. 1, configured to submit print requests to a selected, remote print server and/or printer, such as print server/printer 108 depicted in FIG. 1.

Detailed Description Text (7):

Mobile print support facility 200 includes a mobile print manager 202 receiving print requests for printing services on a selected remote print server and/or printer. Mobile print manager 202 may check the status of network connection 204 to the network containing the selected remote print server/printer upon detecting a print request within the data processing system containing mobile print facility 200. Alternatively, mobile print manager 202 preferably detects errors which occur when a print job is submitted by the data processing system containing mobile print manager 200 to a remote printer queue which is in a disconnected state from the data processing system.

Detailed Description Text (18):

Mobile print manager 202 determines when it is appropriate to replay print jobs within transient print queue 206 to the selected remote printer queue. Mobile print manager 202 periodically checks the connection status of the remote printer queue and, when a connection to the remote printer queue becomes available and transient print queue 206 has been released, initiates replay of any print jobs contained within transient print queue 206 to the selected remote printer queue.

## CLAIMS:

15. The mechanism of claim 9, wherein the mobile print manager determines whether the remote print queue is currently accessible based upon whether the mobile device is connected to a system containing the remote print queue, whether the system containing the remote print queue cannot be contacted due to a network error or fault condition, whether the system containing the remote print queue is shut down or offline, whether a user of the mobile device is logged into a network containing the remote print queue, whether a print requester within the mobile device is running, and whether the remote print queue is shared.

20. The method of claim 17, further comprising:

selecting a highest order transient print queue from a plurality of transient print queues each associated with a different remote print queue;

selecting a highest order print job which is not in a held state from a plurality of print jobs within the selected transient print queue; and

replaying the selected print job to a remote print queue corresponding to the selected transient print queue.

23. A computer program product in a computer usable medium, comprising:

instructions within the computer usable medium, responsive to detecting a print request within a mobile client system for a remote print queue, for determining whether the remote print queue is currently accessible to the mobile client system;

instructions within the computer usable medium, responsive to determining that the remote print queue is not currently accessible to the mobile client system, for determining whether a transient print queue exists within the mobile client system for the remote print queue;

instructions within the computer usable medium, responsive to determining that a transient queue does not exist within the mobile client system for the remote print queue, for creating a transient print queue within the mobile client system for the remote print queue;

instructions within the computer usable medium for spooling a print job corresponding to the print request to the transient print queue;

instructions within the computer usable medium, responsive to detecting the existence of the transient print queue for the remote print queue, for periodically determining whether the remote print queue is currently accessible to the mobile client system; and

instructions within the computer usable medium, responsive to determining that the remote print queue is currently accessible to the mobile client system while the transient queue for the remote print queue exists within the mobile client system, for automatically replaying print jobs within the transient print queue to the remote print queue or to a different remote print queue selected by a user.

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Print

L5: Entry 11 of 25

File: USPT

Jun 12, 2001

DOCUMENT-IDENTIFIER: US 6246487 B1

TITLE: Multi-function unit, server and network system having multi-function unit

Application Filing Date (1):19980324Detailed Description Text (59):

As shown in FIG. 13, a step S1 acquires the image data to be printed from the print source, and a step S2 selects a queue corresponding to the print source from the queues Q1 through Qn stored in the spool 311. A step S3 inputs the acquired image data to the selected queue, and a step S4 obtains the image data from the selected queue and outputs the image data to a corresponding logical printer. A step S5 prints the image data on the recording paper by the logical printer, and a step S6 ejects the recording paper printed with the image data to one or a plurality of bin stackers allocated for the logical printer.

Detailed Description Text (62):

With respect to the logical copying machine 24 and the logical printers 251 through 25n , it is possible to freely set a priority to the order of the printing in the printer engine 21. For example, the priority of the printing order may be set in the order of the print requests received, or the priority of the printing order of the logical copying machine 24 may be set higher than those of the logical printers 251 through 25n so as to give priority to the copying function which has a higher possibility of urgency. In addition, it is possible to freely set the priority to the printing order among the queues Q1 through Qn or among the logical printers 251 through 25n . In this case, the priority of the printing order of the logical printer 252 can be set higher than that of the logical printer 251, for example, so as to give the filing document printing a priority over the facsimile reception printing.

Detailed Description Text (71):

In FIG. 14, the print data is transferred to the server 3 which is coupled to the computer 4 via the LAN 500, but the server 3 to which the print data is transferred does not have to be coupled to the LAN 500. In the case of the network system shown in FIG. 9, the print data may be transferred for example from the computer 4 which is coupled to the LAN 500-1 to the server 3 of the composite apparatus 1 which is coupled to the remote LAN 500-4 via the network 510. In addition, the notifying destination of the print result does not have to be the computer 4 which makes the print request, and may be any computer 4 or any composite apparatus 1 within the network system shown in FIG. 9, for example. Furthermore, the notifying destination of the print result may be set in advance to an address peculiar to each print driver 42 or each print processor 31, and in this case, it is possible to give a priority to a notifying destination which is input from the screen 421 of the print driver 42 if such an input is made.

Detailed Description Text (74):

In FIG. 16, when the computer 4 makes a print request, a step SC1 calls the print driver 42 from the application 41. A step SC2 makes a routing list transmission request from the print driver 42. A step SC3 transmits the routing list transmission request to the server 3 which is set in advance. A step SC4 decides

whether or not a response is received from the server 3 within a predetermined time. If the decision result in the step SC4 is NO, a step SC5 displays the routing list on the screen 421 of the printer driver 42 in blank. In addition, a step S6 adds to the print data a server name of the server 3 which is set in advance, and the process ends.

## CLAIMS:

2. The multi-function unit as claimed in claim 1, further comprising:

a spool storing a plurality of queues for copying or printing,

wherein each of the bin stackers corresponds to a pair of a corresponding one of the queues and a corresponding one of said logical copying machine and said logical printers.

6. The multi-function unit as claimed in claim 1, wherein said printer engine sets a priority of a printing order in an order of print requests received from said logical copying machine and said logical printers.

7. The multi-function unit as claimed in claim 1, wherein said printer engine sets a priority of a printing order so that a print request received from said logical copying machine has a higher priority than print requests received from said logical printers.

8. The multi-function unit as claimed in claim 1, wherein said printer engine variably sets a priority of a printing order with respect to print requests received from said logical printers.

[First Hit](#)   [Fwd Refs](#)

Generate Collection

Print

L5: Entry 12 of 25

File: USPT

Oct 19, 1999

DOCUMENT-IDENTIFIER: US 5970223 A

TITLE: Job interrupt system for multifunctional printing system

Application Filing Date (1):19980108Detailed Description Text (26):

Referring to FIG. 7, a queue of jobs 200 ready for processing with the printer 20 (FIG. 1) is shown. As with other conventional print queues, the job currently being printed is displayed in a window 202 and buttons 204 can be employed to scroll the list of jobs up or down. It should be appreciated that in a multifunctional machine, of the type discussed in the Background above, more than one queue would preferably be employed to accommodate for the various services offered. For example, jobs waiting to be scanned would reside in a scan queue while jobs waiting to be faxed would reside in a fax queue. Essentially the print or mark queue of FIG. 7 may be just one of the plurality of queues employed in the printing system 10. Additionally, it should be appreciated that jobs may be inserted into the queues in a manner consistent with that disclosed by U.S. Pat. No. 5,206,735. Finally, it will be appreciated that the queue could be maintained in, among other locations, the VCM FIG. 3 or the Network Service Module (FIG. 6).

Detailed Description Text (106):

Referring again to FIGS. 11 and 12, after a job portion has been inserted into the print queue (FIG. 12), the process returns to step 240 where a check is performed to determine whether another job portion is to be submitted to the print queue. Assuming that no further portions are to be inserted into the queue, then the interrupt application, at step 242, is disabled; otherwise the process loops back to step 224 to determine if another current unsubmitted job portion is ready for submission to the print queue 220.

Detailed Description Text (156):

1:02:51, QM requests MFSYS to begin printing the Copy Job. (QM-MF1)

Detailed Description Text (226):

1:02:51, QM requests ESS to restart printing the Net Print Job. (QM-ES3)

Detailed Description Text (310):

First, an interrupt system is provided in which an interrupt job can be selected from one of a plurality of service related queues and inserted into a print queue for purposes of interrupting the printing of a job currently in the process of being printed. Pursuant to one embodiment of the interrupt system, the job currently in the process of being printed is interrupted at a page or set boundary if the interrupt job is from one or more selected services and a preselected condition is met. In one example, the preselected condition is met when the interrupt job is from an authorized user or the interrupt job has a priority which is at least as great as the job currently in the process of being printed. Alternatively, the interrupt job is placed behind the job currently in the process of being printed when the interrupt job is from a service other than the one or more selected services.

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Generate Collection

Print

L5: Entry 13 of 25

File: USPT

Feb 16, 1999

DOCUMENT-IDENTIFIER: US 5872569 A

TITLE: Apparatus and method for programming and/or controlling output of a job in a document processing system

Application Filing Date (1):19951030Brief Summary Text (1):

The Present Application is related in subject matter to and cross-referenced with both U.S. patent application Ser. No. 08/560,272 and U.S. patent application Ser. No. 08/550,052, both of which applications are entitled Apparatus and Method for Programming a Job Ticket in a Document Processing System, both of which applications are attributable to the same Applicants as the Present Application, and both of which applications were filed on the same day as the Present Application.

Brief Summary Text (2):

The present invention relates generally to a technique for processing a job in a network document processing system and, more particularly, to an apparatus and method for providing a metaphorical template, representative of a proposed job ticket, with status information and control metaphors so that one segment of the job ticket can be executed while another segment of the job ticket can be reprogrammed due to an unavailable attribute.

Brief Summary Text (48):

U.S. Pat. No. 5,220,674 discloses a server which permits a plurality of clients to communicate with a plurality of printers. The server is intended for processing printing requests that are sent to a printing system and responding to status requests regarding printing requests forwarded to the printing system. The server further provides the printers with resources which they may require to service printing requests and informs the other components of the digital data process of the status of the printing system, such as when it receives printing requests or when it becomes inoperable and needs attention.

Brief Summary Text (50):

Programming a job is often achieved with a "job ticket". For many printing systems, the job ticket is provided in the form of one or more programmable dialogs, each programmable dialog including values which are selected with a user interface, such as the user interface found in a DocuTech.RTM. printing system manufactured by Xerox Corporation. Job tickets can vary dramatically in both structure and functionality. In one instance, the job ticket may assume the form of a relatively simple dialog displayed on a liquid crystal display ("LCD"). Attributes of a corresponding job, such as desired image processing, designated stock and finishing characteristics may be displayed for setting of suitable output values, e.g., stock size.

Brief Summary Text (51):

Since the programming for a job can be relatively complex, it is often desirable to provide a plurality of job tickets, corresponding with a plurality of dialog frames. In practice, each dialog relates to the programming of a set of job

attributes, such as stock characteristics. The following patent relates to a technique in which multiple job tickets may be used to program a job:

Brief Summary Text (56):

At least some of the basic concepts of U.S. Pat. No. 5,079,723 have been incorporated into the DocuTech.RTM. Printing System. The following references, among others, relate to the multiple job ticket scheme of the DocuTech Printing System.

Brief Summary Text (63):

U.S. Pat. No. 5,260,805 discloses an electronic printing system with a touch screen for programming print jobs using job tickets displayed on the screen. The job tickets have various job programming choices together with scaled representations of a print image superimposed on selected print media, and a control for comparing the size of the print image, as originally oriented with the maximum image size. A full message is displayed on the screen, in the event that the print image size exceeds the system maximum image size, even though the print image as displayed fits into the print media.

Brief Summary Text (64):

U.S. Pat. No. 5,398,289 discloses a technique for printing a signature job, i.e., a job resulting in a plurality of sheets being imaged on signature print media sheets, in a selected order for creating a booklet. A plurality of job tickets are employed to program the signature job. In one aspect of the technique, lay-out work for the signatures to be produced is performed with a job ticket in which a gutter and margins are programmably set for each pair of electronic sheets on one side of an electronic signature sheet.

Brief Summary Text (65):

Certain versions of the DocuTech.RTM. printing system can be coupled operatively with one or more network clients by way of a DocuTech Network Server. A multiple job ticket scheme adapted for use in a Network DocuTech.RTM. Printing System is disclosed in the following pending patent application:

Brief Summary Text (69):

The Network Printing System of the '155 application includes a print server having a plurality of print queues mapped with one or more mask files. Each of the queues communicates with one or more workstations and upon selecting one of the print queues with a selected workstation a mask file associated with the selected print queue is communicated to a job ticket processing application. An interclient job ticket, which represents all of the attributes of all of the printers associated with the print queues, is combined with the associated mask file to obtain a user interface dialog job ticket for display at the selected workstation. The user interface dialog job ticket displays the attributes of the printer associated with the selected print queue.

Brief Summary Text (83):

U.S. patent application Ser. No. 08/315,273 discloses a technique related to creating a composite job ticket for use in a printing system with a user interface. The job typically includes multiple job segments which are programmed for output at selected output/storage locations. In practice, attributes for each segment are captured in a respective job ticket and the resulting job tickets are combined to form the composite job ticket.

Brief Summary Text (84):

While the composite job ticket of the '273 patent application is believed to represent an advance in the art of job ticket programming, such composite job ticket, by its very nature may not be appealing, in terms of utilization, to the relatively inexperienced user of a network printing system. More particularly, the manipulation of a relatively complex dialog with a substantial amount of text may

not feel comfortable to those who seek a dialog that is both simple and accessible. Many users, even more experienced users, might very well prefer a dialog which readily illustrates the work flow aspects of a job. The concept of employing an object-oriented workflow model to facilitate data processing is disclosed in the following journal article:

Brief Summary Text (90):

It would be desirable to provide a composite job ticket that is simple, yet effective for use in programming a job to be processed in a network document processing system with multifunctional document processing capability. It would be useful if that composite job ticket could employ concepts analogous to those set forth in the area of workflow so that the user of the composite job ticket could obtain a representation of job flow that illustrates the multifunctionality of the job in a manner that is both straightforward and graphical. Moreover, it would be useful if a construct for facilitating the modification of the composite job, in view of document processing system constraints, could be provided.

Brief Summary Text (95):

In accordance with one aspect of the present invention, there is provided a job ticket programming system for use in a document processing system with a plurality of metaphor elements supplied for programming a job associated with the job ticket. Each of the plurality of metaphor elements corresponds with either a set of document processing devices or a set of storage devices. The job ticket is programmed with a metaphorical template defined by one or more metaphorical combinations, each metaphorical combination including one or more of the metaphor elements. The job ticket programming system includes: a) an application server with a memory for storing first and second selection sets, each of the first and second selection sets corresponding with either the document processing devices available in the set of document processing devices or the storage devices available in the set of storage devices, said application server registering a first one of the plurality of metaphor elements with the first selection set and a second one of the plurality of metaphor elements with the second selection set; b) a user interface with a display screen for displaying the first one of the plurality of metaphor elements and the second one of the plurality of metaphor elements on the screen display of the user interface; and c) an image element for connecting the first one of the plurality of metaphor elements and the second one of the plurality of metaphor elements to form one of the one or more metaphorical combinations. In practice, 1) one of the selections in the first selection set is selected with said user interface, said application server determines which one or more of the selections in the second selection set are compatible for use with the selection of the first selection set and modifies the second selection set to form a modified second selection set which indicates the one or more second selection set selections compatible with the first selection set selection, and 3) the job ticket is programmed with both the first selection set selection and one of the one or more selections of the modified second selection set.

Brief Summary Text (96):

In accordance with another aspect of the present invention, there is provided a job ticket programming system for use in a document processing system with a plurality of metaphor elements supplied for programming a job associated with the job ticket. Each of the plurality of metaphor elements is associated with either the job or a device, the job including attributes describing a manner in which one or more documents are to be processed with the device, and the device including a set of device attributes defining capabilities currently available at the device. The job ticket is programmed with a metaphorical template being defined by one or more metaphorical combinations with each metaphorical combination including a plurality of metaphor elements. The job ticket programming system includes: a) an application server with a memory for storing a set of device attributes, said application server registering a first one of the plurality of metaphor elements with the set of job attributes and a second one of the plurality of metaphor elements with the



set of device attributes; b) a user interface with a display screen for displaying the first one of the plurality of metaphor elements and the second one of the plurality of metaphor elements; and c) an image element for connecting the first one of the plurality of metaphor elements and the second one of the plurality of metaphor elements to form one of the one or more metaphorical combinations. In practice, (1) said application server determines whether a preselected relationship exists between the set of job attributes and the set of device attributes, and (2) the job ticket is programmed with the metaphorical combination when it is determined that the preselected relationship exists.

Drawing Description Text (9):

FIGS. 12 and 13 are partial screen displays including exemplary metaphorical workflow representations used to create job tickets for directing the execution of a job; and

Detailed Description Text (25):

Referring to FIGS. 7-11, a technique for implementing a metaphorical job ticket/control system with the network system of FIG. 6 is described. In general, the flow diagram of FIG. 7 describes a technique for configuring a database with the various profiles of the devices disposed on the network while FIGS. 8 and 9 describe a method for creating a job ticket with a metaphorical template in a manual context. Additionally, the flow diagram of FIG. 10 describes an implementation for creating a job ticket with a metaphorical template in an automatic context. While the flow diagram of FIG. 11 describes an enhancement to both the job ticket creation techniques of flow diagrams 8-10.

Detailed Description Text (39):

Referring to FIG. 17, a specific example illustrating the functionality of a given service provider transfer function is shown. As can be seen, a hard copy is provided to an output, such as a stacker or sorter, and the resulting output is controlled by the job ticket which includes one or more attributes, such as currently available stock (paper). As will appear from the discussion below, a Service Provider transfer function can correspond to either a single component, such as a single stacker or to a composite element including a plurality of devices, such as a binder, folder and slitter. As will also appear from the discussion below, the combination of plural service providers may constrain the associated attribute set.

Detailed Description Text (50):

Once the metaphorical template is complete (step 208), one or more job tickets based on the one or more programmed combinations are created. In practice, a job ticket is created automatically for each selected choice (step 204) by transferring pertinent information of the choice to a dedicated job ticket dialog. In the common scenario, a composite job ticket including one or more input tickets obtained from the attributes in the, for example, initiating metaphor element and a plurality of output tickets derived from the selected choices is provided.

Detailed Description Text (51):

Upon creating the metaphorical template with its corresponding job ticket(s) (step 212), the user is provided with the opportunity, at step 214, to save the template at the client 82. If there is no desire to save the template the metaphorical template is deleted, at 216, subsequent to the creation of the composite job ticket at step 212. On the other hand, the user may store, via step 218, the program template in the memory of the client for future use. Referring to FIG. 12, upon storing a metaphorical template in memory, it may be desirable to link the location of the stored template with a button or a graphic selection bar. In practice, a given button may be labeled in accordance with a system similar to that of Microsoft's Word 6.0. Preferably, a given metaphorical template as shown in FIG. 13 is supplemented with various control and status graphical indicators.

Detailed Description Text (56):

In response to augmenting or narrowing the search term, an additional search, based on the new search term, is performed at step 234. Essentially, the additional search eliminates all instances not fulfilling the augmented or narrowed search. At step 236, the user is informed of the number of instances developed as a result of the additional search and if the number of instances is found to be acceptable, then each of the templates corresponding to the instances is displayed at step 240. In one example, the user scrolls through each metaphor template developed as a result of the additional search. As a result of scrolling through the various templates corresponding with the entered search term, the user, at step 242, chooses an instance to serve as the template. In accordance with the template chosen, a composite job ticket is created in a manner consistent with that described above.

Detailed Description Text (62):

Upon selecting the indicator, the user may decide, at step 256, to modify an attribute of the job or an attribute associated with the selected metaphor. In one example, it may be indicated that the operation of a selected device is simply delayed. Under these circumstances, a user may wish to proceed with examining the various devices of the metaphorical template without altering the job or the device under examination. On the other hand, at step 258, one or more attributes of either the job or the device associated with the subject metaphor may be altered in view of the status indicator of that device. As will be appreciated, as a result of modification, a conflict may arise between the device attributes within the metaphorical template. For example, an output stock choice at a scanner may be changed to transparency and the job ticket corresponding with the metaphorical template may call for duplexing at a printer of the template. Since most systems do not allow duplexed transparencies, an appropriate flag will be raised as a result of the check of step 260.

Detailed Description Text (70):

Numerous features of the above-described embodiment can be appreciated by those skilled in the art. First, a technique is provided in which a user can develop a metaphorical template manually, which template is ultimately stored for usage in the form of a job ticket. In the manual approach for developing templates, the user can make choices of devices at each metaphor element and override default attributes if so desired. The orderly management of the available choices and attributes is provided transparently by an application server which updates attribute profiles dynamically. Consequently, the system of the preferred embodiment assists the user in avoiding the programming of unfeasible metaphorical combinations, and hence unfeasible job tickets.

Detailed Description Text (72):

Finally, for a given template, indicators can be provided for each metaphor element to facilitate the job ticket creation process in several respects. In one example, a status indicator is provided for each metaphor to indicate the operational status of a corresponding device. In view of the status indicator, the user can modify a job or the device in order to facilitate processing of the job. In yet another example, each metaphor element can be provided with a controls indicator so that one combination within a template can be executed while modifications are being made to another metaphorical combination. Consequently, for a given metaphorical template, certain metaphorical combinations can be executed while others are being revised or redeveloped. Preferably, each of the devices is configured in such a way that the status indicators are dynamically updated. As will be understood, this dynamic updating greatly facilitates use of the controls indicators which permit the user to start and stop selected devices depending on their current status.

## CLAIMS:

1. In a network document processing system for executing a job with a job ticket at

both a first set of one or more network devices and a second set of one or more network devices in which the first set of one or more network devices and the second set of one or more network devices communicate with one another by way of the network, a control system for controlling execution of a first portion of the job at the first set of one or more network devices and a second portion of the job at the second set of one or more network devices, comprising:

a) a user interface with a screen display;

b) a graphical job control arrangement displayed on said user interface screen display, said graphical job control arrangement including,

(i) a first metaphor element representative of the first set of one or more network devices, said first metaphor element being displayed as a graphical image on said screen display,

(ii) a second metaphor element representative of the second set of one or more network devices, said second metaphor element being displayed as a graphical image on said screen display,

(iii) a first control metaphor visually linked, on said user interface screen display, with said first metaphor element for controlling execution of a first portion of the job selectively with respect to at least one of the first set of one or more network devices and indicating whether the at least one of the first set of one or more network devices is currently in an operational state or a nonoperational state, and

(iv) a second control metaphor visually linked, on said user interface screen display, with said second metaphor element for controlling execution of a second portion of the job selectively with respect to at least one of the second set of one or more network devices and indicating whether the at least one of the second set of one or more network devices is currently in an operational state or a nonoperational state,

(v) wherein the first portion of the job is communicated to the at least one of the first set of one or more network devices and said first control metaphor indicates that the at least one of the first set of one or more network devices is in the operational state,

(vi) wherein the second portion of the job is communicated to the at least one of the second set of one or more network devices and said second control metaphor indicates that the at least one of the second set of one or more network devices is in the nonoperational state, and

(vii) in response to the indication provided in (v), the first portion of the job is executed and, in response to the indication provided in (vi), execution of the second portion of the job is delayed, through employment of said second control metaphor, until a modification is performed relative to a selected one of the second portion of the job and the at least one of the second set of one or more network devices.

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L5: Entry 21 of 25

File: USPT

May 14, 1996

DOCUMENT-IDENTIFIER: US 5517316 A

TITLE: Apparatus and method for saving/storing job run information generated by processing a job on a printing machine

Application Filing Date (1):  
19931027Drawing Description Text (5):

FIG. 6 is a view depicting an exemplary job programming ticket and job scorecard displayed on the User Interface (UI) touchscreen of the printing system shown in FIG. 1, the job ticket and job scorecard being associated with a job to be printed;

Detailed Description Text (16):

Referring to FIG. 6, jobs are programmed in a Job Program mode in which there is displayed on touchscreen 62 a Job Ticket 150 and a Job Scorecard 152 for the job being programmed. Job Ticket 150 displays various job selections available for programming, while Job Scorecard 152 displays the basic instructions to the system for printing the job. Various Job Ticket types are provided, with access by means of Job Types and Tickets icon 157.

Detailed Description Text (17):

Job Tickets 150 have three programming levels, referred to as "Job Level", "Basic", and "Special", each having a series of icons for accessing the various programming selections available at that level. Each programming level has a Scorecard 152 associated with it so that on activation of a particular job level or of a specific icon, the appropriate Scorecard is displayed on touchscreen 62.

Detailed Description Text (19):

Referring to FIGS. 7 and 8, the image files are arranged in a job file 155, with the print jobs 156 numbered consecutively in the order in which the print jobs are scanned in. Where the operator wishes to see the jobs currently residing in job file 155, as for example, to select jobs to be moved to the print queue for printing, a SYSTEM FILE icon 157 on touchscreen 62 is actuated. This displays a list 160 of the jobs 156 currently in the job file on screen 62, an example of which is shown in FIG. 8. Each job is identified by a descriptor showing the type of job, job number, number of prints, etc. By using up and down scrolling icons 161, 162, the operator can scroll the list of jobs where the number of jobs in the job file is too large to be simultaneously displayed on touchscreen 62.

Detailed Description Text (26):

Referring to step 216, an exemplary approach for generating and storing job run information is discussed. Initially, a copy of the parent is made. Preferably, it should be determined, via step 218, whether the copy is placed in the job file 155 or the print queue 165. Typically, a copy of a parent is placed in the job file so that it can be edited. If the copy of the parent is edited, then that copy, for purposes of appropriate record keeping, should then become a new parent. Accordingly, at step 220 the copy of the parent assumes the role of a parent and a part of the process is then repeated to set up, if necessary, a database or database entry for the new parent. For a copy of the parent transferred to the

print queue the copied job gets a pointer 203 to the database 200 (step 222). Additionally, it may be, under certain circumstances, desirable to change the job ticket of the copied job (step 223). In one example, the parent requires the printing of many sets so that it is desirable to print copies of the parent over a number of days. In this case, upon copying the parent to the print queue, the number of sets to be printed would be reduced to a suitable number to be printed in the current day. If reprogramming of the job ticket is desired, then the process proceeds to step 224, otherwise, the process proceeds to step 228 where, at an appropriate moment, the offspring is printed.

## CLAIMS:

5. The printing system of claim 1, in which the printing of the first copy of the parent job is facilitated by referring to a programmable job ticket with the plurality of attributes and one of the attributes calls for an image to be supplied during the printing of the first copy of the parent job, wherein, during the printing of the first copy of the parent job a substitute image is substituted for the called for image, and wherein information regarding the substitute image is included in the first subset.

6. The printing system of claim 1, in which the printing of the first copy of the parent job is facilitated by referring to a programmable job ticket with the plurality of attributes and one of the attributes calls for a stock to be supplied during the printing of the first copy of the parent job, wherein, during the printing of the first copy of the parent job a substitute stock is substituted for the called for image, and wherein information regarding the substitute stock is included in the first subset.

7. The printing system of claim 1, in which the print queue is disposed in one of a plurality of printers including a plurality of print queues, respectively, wherein the first subset includes a record of which one of the plurality of print queues was used to hold the first copy of the parent job.

11. The printing system of claim 10, in which the printing of the first copy of the parent job is facilitated by referring to a programmable job ticket with the plurality of attributes and one of the attributes calls for an image to be supplied during the printing of the first copy of the parent job, wherein, during the printing of the first copy of the parent job a substitute image is substituted for the called for image, and wherein information regarding the substitute image is included in the first subset.

12. The printing system of claim 10, in which the printing of the first copy of the parent job is facilitated by referring to a programmable job ticket with the plurality of attributes and one of the attributes calls for a stock to be supplied during the printing of the first copy of the parent job, wherein, during the printing of the first copy of the parent job a substitute stock is substituted for the called for image, and wherein information regarding the substitute stock is included in the first subset.

13. The printing system of claim 10, in which the print queue is disposed in one of a plurality of printers including a plurality of print queues, respectively, wherein the first subset includes a record of which one of the plurality of print queues was used to hold the first copy of the parent job.

14. The printing system of claim 13, wherein the record of which print queue was used to hold the first copy of the parent job is used to direct the second copy of the parent job to one of the plurality of print queues.

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Print

L5: Entry 22 of 25

File: USPT

Nov 14, 1995

DOCUMENT-IDENTIFIER: US 5467434 A

TITLE: Apparatus and method for determining printer option availability and representing conflict resolution in a combination of print job selections

Application Filing Date (1):  
19920828Brief Summary Text (2):

In a printing system referred to as a "network printing system," a number of client inputs, such as workstations, personal computers, and the like, typically are combined with one or more printer outputs through a network. In systems of this type, one of the client inputs sends electronic documents and electronic job programming instructions, both of which comprise a print job over the network to a printer selected for printing the print job. In effect, the programming instructions tell the printer that has been selected how to process the electronic documents of the job. One way of doing this is to use an electronic job ticket that is displayed on the screen of the client's User Interface. Using a mouse, keyboard, etc., the client selects from the menu of options in the job ticket displayed on the screen the choices that he desires.

Brief Summary Text (11):

U.S. patent application Ser. No. 07/752,155 discloses a network printing system comprising a client coupled with a server, the client including a user interface coupled with a combining circuit, and the server including a plurality of print queues mapped respectively to a plurality of mask files by way of a queue configuration file. In operation, a combination of printing selections is programmed on the user interface and transmitted to a selected one of the print queues. With reference to the selected print queue, the queue configuration file then chooses an appropriate mask and communicates the mask to the combining circuit. Through use of the combining circuit, an interclient job ticket is combined with the mask so that the print selections available at the printer corresponding to the selected print queue are displayed to the user via the user interface.

Drawing Description Text (4):

FIG. 3 is a representation of a format for an electronic job ticket;

Drawing Description Text (5):

FIGS. 4 and 5 are representations of job tickets used to program portions of a print job as displayed on a client screen;

Detailed Description Text (3):

System 10 provides print processing for various workstations or clients 15-1,15-2, 15-3, . . . 15-n. Clients 15-1,15-2, 15-3, . . . 15-n, which may be remote and/or on site, are operatively coupled to printers 12-1, 12-2,12-3, 12-n through server 25 as will appear. Clients provide the electronic documents that are the source of the print jobs and for this purpose individual ones or all of clients 15-1,15-2, 15-3, . . . 15-n may have a document scanner, disk input, keyboard, fax, etc. for generating the electronic documents that comprise the job to be printed. Clients 15-1,15-2, 15-3, . . . 15n have a User Interface (UI) 16 with interactive screen 17

enabling programming selections for print jobs to be made, screen 17 displaying the various programming selections available in the form of a job ticket as will appear. Printers 12-1, 12-2, 12-3, . . . 12-n, clients 15-1, 15-2, 15-3, . . . 15-n, and server 25 are operatively interconnected by network or communication channels 27.

Detailed Description Text (4):

Referring to FIG. 2, the relationship of a single client, such as client 15-1, to the server 25 is shown in further detail. In the illustrated embodiment of FIG. 2, the client 15-1 includes one of the UIs 16 and an electronic job ticket 35, which job ticket 35 permits the user to program a print job for transmission to the server 25. Job ticket 35 contains the programming parameters for the job such as quantity, plex, enlargement, reduction, stock, finishing, etc. In one example, electronic documents 39, which include the information that is ultimately printed on print media, is transmitted from the client 15-1 to the server 25. The client 15-1 further includes a combination examiner 37, the significance of which will be discussed in further detail below.

Detailed Description Text (5):

Referring to FIG. 3, the client/server job ticket 35 may assume an ASCII format. Additionally, by employment of suitable client UI interface dialog software, print job selections may be displayed on the screen 17 of the UI 16 so that the user can be apprised of which printing selections are available for programming a print job. Examples of job ticket displays are shown in FIGS. 4 and 5 of the drawings. In particular, the job ticket display of FIG. 4 permits the user to choose selected media description parameters while the job ticket display of FIG. 5 permits the user to choose finishing options. It should be appreciated that in practice, the display of FIG. 5 would include many more finishing options than are shown. Examples of finishing options other than those shown in FIG. 5 can be found below in FIGS. 14A-14C.

Detailed Description Text (6):

Referring again to FIG. 2, the server 25 includes one or more print queues 42-1, 42-2, 42-3, . . . 42-n, the print queues 42 being provided, for selection by the user, on a section or file 43. Each of the print queues 42 is mapped to one of configuration files or printer profiles 44-1, 44-2, . . . 44-n. Each of the printer profiles includes a list of printer properties, the properties, as explained in further detail below, being arranged advantageously to describe the combinations of print job selections available at a selected one of the printers 12. While, in the example of FIG. 2, the print queues 42 and printer profiles 44 are shown as being mapped in a one-to-one relationship, various other mapping arrangements are contemplated by the present invention.

Detailed Description Text (9):

Preferably, the electronic documents 39 are placed in a document directory 48. The server 25 further comprises a server processor 50, the server processor 50 being capable of combining a set of documents 39 with a corresponding combination of print job selections to form a print job. One example of a server processor capable of combining a set of electronic documents, such as a print data (page description language) file and a corresponding combination of print job selections, such as a job ticket, into a job file for printing can be found in a patent application entitled "A Method for Translating a Plurality of Printer Page Description Languages," filed Jun. 12, 1992, Attorney's Docket No. 92186, the pertinent portions of which are incorporated herein. In the preferred embodiment of the present invention, printer profiles 44 are composed of 3 distinct segments:

Detailed Description Text (17):

In practice, at step 52-1, the page size requested in the programmed combination from a selected client is compared to a page size for a first set of parameters in the printer profile. For a negative decision, the process proceeds to step 52-2

and, if necessary, through one or more of steps 52-3 ...52-N so that either the page size is found in the printer profile or a fault message is displayed on the UI 16 of the selected client (step 54). Provided that a positive decision results at step 52-1, a comparison for media color is performed at step 56. If the media color selected by the user does not equal STRING C1, a fault message is displayed (step 58), and if media color selected does equal STRING C1, then media weight is considered at step 60-1. If the selected media weight does not match any of values for MEDIAWEIGHT listed in steps 60-1, 60-2 . . . 60-N, then a fault message is displayed (step 64). Provided the selected media weight does equal either W1, W2 . . . WN, a comparison is made at either step 66-1, 66-2 . . . 66-N to determine if the media type selected by the user is in the first printer profile combinations. Through use of steps 66-1, 66-2 . . . or 66-N, it can be determined whether MEDIA TYPE equals STRINGT1, STRINGT2 . . . or STRINGTN. If, on the other hand, MEDIA TYPE does not equal one of these values, then a fault message is displayed at one of steps 70-1, 70-2 . . . or 70-N. If MEDIA TYPE does equal one of these values then the job ticket 35 (FIG. 2) is transmitted to the print queue 42-1 (steps 72-1, 72-2, . . . 72-N) for use in printing the corresponding print job.

Detailed Description Text (20):

Referring to FIGS. 11 and 12A, in a first example of operation, a combination of print job selections are programmed by the user at a UI 16 and inserted into the parameter block 82. A comparison of these parameters with the decision tree 76 indicates that a permissible combination of print job selections has been programmed. Accordingly, the corresponding job ticket 35 (FIG. 2) is transmitted to one of the print queues 42. Referring to FIGS. 11 and 12B, in a second example of operation, a combination of print job selections are programmed by the user at a UI 16 and inserted into the parameter block 82. A comparison of these parameters with each of the decision trees 76, 78 and 80 (FIG. 11) indicates that an impermissible combination of print selections has not been programmed. Accordingly, a fault message is communicated from the combination examiner 37 to the UI 16 (FIG. 2) indicating to the user that an impermissible choice has been made.

CLAIMS:

8. The printing system of claim 7, wherein said input section includes a job ticket for communicating the combination of print job selections from said input section to said print queue section.

18. The method of claim 10, further comprising the step of coupling the user interface to the plurality of printers with at least one print queue, and wherein the transmitting step includes transmitting the programmed combination of print job selections to the print queue prior to transmitting the programmed combination of print job selections to the selected printer.



First Hit    Fwd Refs☐ **Generate Collection** **Print**

L5: Entry 23 of 25

File: USPT

Jul 5, 1994

DOCUMENT-IDENTIFIER: US 5327526 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Print job control system

Abstract Text (1):

A print job control system which processes print requests to set an order of priority for printing print jobs. A print job manager checks the print request and determines what print option is selected and manipulates the queue identifiers associated with respective print jobs and enters them into a print queue table. One feature allows changing the print order thereby overriding the designated print option. Another feature allows for increasing the priority of low priority jobs regardless of the designated print option assuring that the low priority jobs will be printed.

Application Filing Date (1):

19931124

Brief Summary Text (3):

This invention relates to a print job control system that is linked to a local area network (LAN) or other communications information networks for efficient processing of print requests generated from a plurality of workstations.

Brief Summary Text (10):

(1) print requests are sorted according to the time they are entered (First-in First-out, or FIFO);

Brief Summary Text (12):

(3) print requests are sorted according to the requested time of printing (Short Job First); and

Brief Summary Text (16):

A further problem with the prior art occurs with the four sort options described above, since a print job that is located toward the end of the print queue table will never be executed as long as a higher-priority print request is accepted.

Brief Summary Text (20):

To achieve the objects and in accordance with the purpose of the invention, as embodied and broadly described herein, the print job control system of this invention comprises means for accepting a print request from the workstation on the network, means for designating one of a plurality of sort options to set the priority for printing print jobs, means for managing the printing order of print jobs by checking the print request against the sort option and establishing a queue identifier in accordance with the sort option, a print queue table for receiving queue identifiers from the managing means at selected queue positions in the table which correspond to the order of execution of the print jobs, means for changing the printing order of print jobs and thereby overriding the sort option by rewriting the queue identifier for a print job in the print queue table, and means for processing the print jobs in accordance with the order of queue identifiers in the print queue table.

Detailed Description Text (3):

FIG. 1 is a block diagram showing the basic concept of the present invention, which comprises a print job control system 1, a print job processor 2, a print request acceptor 3, and a sort option designator 4. The print job control system 1 is comprised of a print job manager 5, and a print queue table 6 which holds print job identifiers in the form of a queue.

Detailed Description Text (4):

In the print job control system of this invention, the print job manager 5 manages the order of executing print jobs from workstations 11 received through the print request acceptor 3. The jobs are arranged in the order determined by the sort option designator 4 or by the operator's designation or by the manipulation of priority values. The print job control system performs a print-out operation by outputting print jobs to the print job processor 2 according to the order of print queue identifiers thus set on the print queue table 6. These procedures enable efficient execution of the print jobs generated from a plurality of workstations.

Detailed Description Text (5):

In operation, data concerning the print job transferred over network 10 (FIG. 9) is entered into printer 12 through the print request acceptor 3.

Detailed Description Text (9):

Referring again to FIG. 1, the print job data accepted by the print request acceptor 3 is inputted to the print job manager 5 in the print job control system 1. The print job manager 5 generates a queue identifier of the accepted print job in accordance with the control data 100 and places the queue identifier at a selected position in a column of print queue identifiers that has been generated in the print queue table 6 according to either the sort option designated by the operator from the sort option designator 4 or the order designated by the operator after the sort option was canceled or according to a preset algorithm.

Detailed Description Text (12):

As embodied in FIG. 4 the print job control system of this invention includes a printing order checker 7, a printing order manipulator 8, and printing order changer 9. The print job data accepted by the print request acceptor 3 is applied to the print job control system 1. One of the sort options (1)-(4) is designated by the sort option designator 4. The printing order checker 7 in the print job manager 5 checks the printing order that complies with the designated sort option, and the printing order manipulator 8 places the queue identifier of the accepted print job at a selected queue position in the print queue table 6.

Detailed Description Text (18):

When the printer starts to run, the print job control system checks for the acceptance of a print job to be processed (step 1 which hereafter is abbreviated as S-1). If the print request is honored, the system checks to see if a sort option has been designated (S-2). If the answer is negative, the identifier of the honored print job is inserted at the end of the queue in the print queue table. If a certain sort option has been designated, the system checks the printing order according to the designated sort option (S-3).

Detailed Description Text (28):

The print job data transferred from a workstation over network 10 is honored by the print request acceptor 3 and is inputted to the print job control system 1. In accordance with the order designated by the sort option designator 4 and/or the priority value written into the print job control data, the printing order checker 7 in the print job control system 1 checks the printing order and, on the basis of the result of checking or in accordance with the printing order determined by the operator's manipulation in the manner already described with the first embodiment, the printing order manipulator 8 sets a new order of queue identifiers in the print queue table 6.

Detailed Description Text (30):

FIGS. 7A-7F show how the print job table is manipulated over some time period by calculation of priority values. Suppose the print queue table 6 has the initial state shown in FIG. 7(A). As already mentioned, the print job control data supplied from the print request acceptor 3 contains a certain value of priority. If the priority threshold for preferential printing operation is 100 (as indicated by the level of line TH in FIG. 7(A)), queue identifiers having priority values of 100 and over will be located closer to the top of the queue table (the higher the priority value of a queue identifier, the closer it is to the head of the queue table).

Detailed Description Text (39):

These procedures are taken at every interval of time T and the queue table is manipulated in the manner already described with reference to FIG. 7. As a result, even a print job that initially had a low priority when the print request was honored is sure to be executed for printout after the lapse of an appropriate time.

Detailed Description Text (43):

As described on the foregoing pages, the print job control system of the present invention is suitable for use with a printer having a sort option capability and even in the case where a certain sort option is already set, the operator is free to modify the order of arrangement of queue identifiers on the print queue table so that he can meet the requirement for urgent printout. Further, the system has the added advantage that even a print job having a low priority value when its request is honored can be executed for printout within an appropriate time by increasing its priority value at appropriate time intervals, and this successfully solves another major problem of the prior art, i.e., an unlimited delay in executing print jobs having low priority values.

## CLAIMS:

1. A print job control system for controlling the order of executing a plurality of print jobs transmitted on a computer network having a plurality of workstations for transmitting the plurality of print jobs and corresponding print request, a print job processor for executing the print jobs, and means for designating any one of a plurality of sort options, said print job control system comprising:

means, responsive to the designated sort option, for managing the order of executing print jobs, the managing means including,

means for establishing a queue identifier having a priority value corresponding to the priority for executing the any one of the plurality of print jobs in accordance with the designated one of a plurality of sort options,

a print queue table for receiving the plurality of established queue identifiers at queue positions in said print queue table corresponding to the order of the print jobs in accordance with the priority value;

means for changing the order of executing print jobs including,

means for establishing the priority value of any one of the plurality of queue identifiers independent of the designated sort option.

means for periodically changing the priority value of any one of the plurality of queue identifiers in the print queue table by adding a predetermined value to reflect a high priority in accordance with the duration held in the print queue table; and

means for executing the print jobs in accordance with the order of queue

identifiers in said print queue table.

3. A print job control system for controlling the order of printing a plurality of print jobs transmitted on a computer network having a plurality of workstations for transmitting the plurality of print jobs and corresponding print requests, a print job processor for printing the plurality of jobs and means for designating any one of a plurality of sort options, said print job control system comprising:

means, responsive to the designated sort option, for managing the order of printing print jobs including,

means for establishing a queue identifier for the any one of the plurality of print request, the queue identifier having a priority value corresponding to the priority for printing the any one of the plurality of print jobs in accordance with the designated one of a plurality of sort options;

a print queue table for receiving the plurality of established queue identifiers at queue positions in said print queue table in accordance with the priority value;

means for selecting a predetermined value and for adding the predetermined value to the priority value of each of the queue identifiers held in said print queue table to reflect a higher priority in accordance with the duration held in the print queue table; and

means for printing the print jobs in accordance with the order of queue identifiers in said print queue table.

4. A method of processing a plurality of print jobs, comprising the steps of:

receiving a print job request corresponding to any one of the plurality of print jobs;

determining which one of a plurality of sort options has been designated;

checking the order of the print jobs held in a print queue table in accordance with the print job request and the designated sort option;

generating a queue identifier having a priority value corresponding to the priority for executing the any one of the plurality of print jobs;

adding a predetermined value to the priority value of each queue identifier held in the print queue table to reflect a higher priority in accordance with the duration held in the print queue table; and

entering said queue identifiers, after the step of adding the predetermined value, in the print queue table.